Claims

1 (Canceled)

2 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30,
said polarization layers Pi being cartesian polarizers, and said polarization layers Pi being arranged in planes which are perpendicular to a common ground plane, and all said optical axes being coplanar to a common ground plane.

3 (Previously presented): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 2,
said polarizing layer vector V1 of P1 and said polarizing layer vector V2 of P2 being perpendicular to each other.

4 (Previously presented): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 3,
said polarizing layers P2 and P3 forming a common polarization layer.

5 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, comprising
at least one right triangular prism composed of two right prisms T1 and T2 each with an isosceles triangular base;
the lateral surface of sub-prism T2 in-between the two sub-prisms carrying a cartesian polarization layer P1;
the lateral surface of sub-prism T1, which together with a lateral surface of sub-prism T2 forms a common lateral surface of said composed prism, carrying a cartesian polarization layer P2.

6 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, comprising
a right prism with an isosceles triangular base;
the two lateral surfaces of equal size of said prism carrying mutually complementary polarizations layers.

7 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30,
comprising an additional fourth polarization layer P4 which together with said P2

and with said P3 constitutes an additional cross-polarizer according to claim ~~1~~ 30.

8 (Previously presented): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 7,
polarization layers P1 and P4 having parallel polarizing layer vectors and being coplanar, and the polarization layers P2 and P3 having parallel polarizing layer vectors and being coplanar, and all four layers having an intersection line.

9 (Withdrawn): Complex polarizer system for reciprocal polarization (cross-polarizer) comprising
at least two polarizing layers Pi (i=1,2,..);
said Pi characterized by a normal vector Ni normal to Pi and a polarizing layer vector Vi coplanar to Pi;
said Pi having beam splitting properties, which split an incident beam into a transmitting and a reflected beam;
said Vi and the reflected beam spanning the plane of polarization of the reflected beam;
said Vi and the transmitting beam spanning a plane perpendicular to the plane of polarization of the transmitting beam;
P1 and a further polarizer being arranged along a first optical path S1 such that the plane E1 is spanned by V1 and the optical axis of S1 in P1, and the plane E2 is spanned by the polarizing layer vector of said further polarizer and the optical axis of S1 in said further polarizer;
said two polarizing layers being mutual complementary, characterized by the plane E1*, derived from E1 by optional means for folding, being perpendicular to E2;
P1 and a further polarizer being arranged along a second optical path S2 such that the plane E3 is spanned by V1 and the optical axis of S2 in P1, and a plane E4 is spanned by the polarizing layer vector of said further polarizer and the optical axis of S2 in said further polarizer;
said two polarizing layers being mutual complementary, characterized by the plane E3*, derived from E3 by optional means for folding, being perpendicular to E4;
said two optical paths S1 and S2 intersecting in P1 with equal cutting angles between N1 and S1 and between N1 and S2;
the architecture of the system coupling the transmission at P1 to a reflection at the

further polarizer along S1 and the corresponding reflection at P1 to a transmission at the further polarizer along S2.

10 (Withdrawn): Complex polarizer system for reciprocal polarization (cross-polarizer) comprising

at least three polarizing layers Pi (i=1,2,3,..);

said Pi characterized by a normal vector Ni normal to Pi and a polarizing layer vector Vi coplanar to Pi;

said Pi having beam splitting properties, which split an incident beam into a transmitting and a reflected beam;

said Vi and the reflected beam spanning the plane of polarization of the reflected beam;

said Vi and the transmitting beam spanning a plane perpendicular to the plane of polarization of the transmitting beam;

P1 and P2 being arranged along a first optical path S1 such that the plane E1 is spanned by V1 and the optical axis of S1 in P1, and the plane E2 is spanned by V2 and the optical axis of S1 in P2;

said polarizing layers P1 and P2 being mutual complementary, characterized by the plane E1*, derived from E1 by optional means for folding, being perpendicular to E2;

P1 and P3 being arranged along a second optical path S2 such that the plane E3 is-spanned by V1 and the optical axis of S2 in P1, and a plane E4 is spanned by V3 and the optical axis of S2 in P3;

said polarizing layers P1 and P3 being mutual complementary, characterized by the plane E3*, derived from E3 by optional means for folding, being perpendicular to E4;

said two optical paths S1 and S2 intersecting in P1 with equal cutting angles between N1 and S1 and between N1 and S2;

the architecture of the system coupling the transmission at P1 along S1 to a reflection at P2 and the corresponding reflection at P1 to a transmission at P3 along S2.

11 (Withdrawn): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 10,

comprising an additional fourth polarizing layer P4, which together with said P2 along a third optical path S3 and together with said P3 along a fourth optical path S4 constitutes an additional cross-polarizer according to claim 10.

12 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, at least one of said layers Pi being a doubled or two-sided cartesian polarizer with parallel layer vectors Vi.

13 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, all of said Pi being cartesian polarizers, e.g. wire grid polarizers.

14 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, all of said Pi being thin-film polarizers of the MacNeille type.

15 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, all of said Pi being contained in a body and the optical paths into and out of the cross-polarizing system being made possible by windows or openings.

16 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, further comprising at least two spatial light modulators; said polarizer system being used to feed the spatial light modulators with polarized light.

17 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, further comprising at least two spatial light modulators; said polarizer system being used to superpose the modulated light from the spatial light modulators.

18 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, further comprising at least two spatial light modulator of the type micro-electro-mechanical-system (MEMS, e.g. DMD by Texas Instruments); said polarizer system being used to feed the spatial light modulators with polarized light and to superpose the modulated light from the spatial light

modulators.

19 (Withdrawn): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 9, further comprising at least one spatial light modulator positioned in said optical paths S1 and S2 between P1 and P2.

20 (Previously presented): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim 15, further comprising at least one spatial light modulator which is mounted to the body.

21 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30,
comprising at least one right triangular prism;
said prism being composed of two right triangular sub-prisms with the base of an isosceles triangle each, with a thin-film type polarizing layer P1 with its layer vector V1 being situated between these two sub-prisms;
the lateral surface of the compound prism which consists of two lateral surfaces of the sub-prisms carrying a cartesian polarizing layer P2 with its layer vector V2;
V2 being perpendicular to V1.

22 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30,
comprising at least one right triangular prism;
said prism being composed of two right triangular sub-prisms with the base of an isosceles triangle each, with a cartesian type polarizing layer P1 with its layer vector V1 being situated between these two sub-prisms;
the lateral surface of the compound prism which consists of two lateral surfaces of the sub-prisms carrying a cartesian polarizing layer P2 with its layer vector V2.

23 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, comprising
at least one right triangular prism;
said prism being composed of two right triangular sub-prisms T1a, T1b with the base of an isosceles triangle each;

those lateral surfaces of the compound prism, which consist of only one lateral surface of the sub-prisms carrying polarization layers P1 and P2.

24 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30, comprising
at least one right triangular prism;
said prism being composed of two right sub-prisms with the base of an isosceles triangle each;
a thin-film type polarizing layer P1 being situated between these two sub-prisms.

25 (Currently amended): Complex polarizer system for reciprocal polarization (cross-polarizer) according to claim ~~29~~ 30,
all cartesian polarizing layers being doubled or two-sided.

26 (Currently amended): Method of using a cross-polarizer according to claim ~~29~~ 30.

27 (Withdrawn - currently amended): Method for reciprocal polarization (cross-polarization),
using a light source;
using three polarization beam splitting layers $P_{trans1ref1}$, with a polarizing layer vector $V_{trans1ref1}$, P_{ref2}, with a polarizing layer vector V_{ref2}, and P_{trans2}, with a polarizing layer vector V_{trans2};
using the optical axis A_{trans1} and the optical axis A_{ref1} which is derived from A_{trans1} by mirroring A_{trans1} at the plane of $P_{trans1ref1}$;
using a polarized beam $B_{trans1ref2}$, which transmits $P_{trans1ref1}$ along A_{trans1}~~,~~ ~~located between $P_{trans1ref1}$~~;
using a polarized beam $B_{ref1trans2}$, which is reflected at $P_{trans1ref1}$ along A_{ref1};
arranging $B_{trans1ref2}$ and $B_{ref1trans2}$ such that they form a common beam with both polarization components of $B_{trans1ref2}$ and $B_{ref1trans2}$ on one side of $P_{trans1\text{-}ref1}$;
choosing $V_{trans1ref1}$ such that the plane of polarization of $B_{trans1ref2}$ is perpendicular to the plane spanned by $V_{trans1ref1}$ and A_{trans1}, and that the plane of polarization of $B_{ref1trans2}$ is spanned by A_{ref1} and $V_{trans1ref1}$;
guiding $B_{trans1ref2}$ on an optical path between $P_{trans1ref1}$ and P_{ref2};
arranging P_{ref2} such that the optical path of $B_{trans1ref2}$ leads to P_{ref2} in the optical axis A_{ref2};

arranging Pref2 such that Btrans1ref2 is reflected at Pref2 by choosing Vref2 such that the plane of polarization of Btrans1ref2 is spanned by Aref2 and Vref2, therefore coupling the transmission of Btrans1ref2 at Ptrans1ref1 to a reflection of Btrans1ref2 at Pref2;

guiding Bref1trans2 on an optical path between Ptrans1ref1 and Ptrans2;

arranging Ptrans2 such that the optical path of Bref1trans2 leads to Ptrans2 in the optical axis Atrans2;

arranging Ptrans2 such that Bref1trans2 transmits Ptrans2 by choosing Vtrans2 such that the plane of polarization of Bref1trans2 is perpendicular to the plane spanned by Atrans2 and Vtrans2, therefore coupling the reflection of Bref1trans2 at Ptrans1ref1 to a transmission of Bref1trans2 at Ptrans2.

28 (Withdrawn): Method for reciprocal polarization (cross-polarization),

using a light source;

using four polarization beam splitting subprocesses (either a polarizing transmission or a polarizing reflection at a polarizing beam splitting layer) Ptrans1, Pref1, Pref2, Ptrans2;

using a polarized beam Btrans1ref2, transmitting at the process Ptrans1;

using a polarized beam Bref1trans2, which is reflected at Pref1;

said Ptrans1 and Pref1 subprocesses being the polarizing transmission subprocess and polarizing reflection subprocess of a common polarization split process;

sending Btrans1ref2 through the polarizing reflection subprocess Pref2, thus coupling the polarizing transmission Ptrans1 of Btrans1ref2 to the polarizing reflection Pref2 of Btrans1ref2;

sending Bref1trans2 through the polarizing transmission subprocess Ptrans2, thus coupling the polarizing reflection Pref1 of Bref1trans2 to the polarizing transmission Ptrans2 of Bref1trans2.

29 (Withdrawn): Complex polarizer system for reciprocal polarization (cross-polarizer), comprising an arrangement of

three polarizing beam splitting layers Pi (i=1,2,3);

the position of each of said Pi described by its unit normal vector Ni and its position vector Li;

the polarization beam splitting characteristics of Pi described by a polarizing layer vector Vi coplanar to Pi such that light incident on Pi in Li along an arbitrary incidence vector Ti is split into a transmitted beam with the plane of

polarization trans-POP: $((Ti \times Vi) \times Ti) \circ (\mathcal{X} - Li) = 0$, and a reflected beam

(the according reflection vector being described by $Ri = Ti - 2(Ti \circ Ni)Ni$) with

the plane of polarization ref-POP: $(Ri \times Vi) \circ (\mathcal{X} - Li) = 0$, with $(a \circ b)$

being the scalar product of the two vectors a and b and with $(a \times b)$ being the cross product of the two vectors a and b;

one axis, described by axis vector A1 and said L1;

P1 and A1 defining

the axis vector A2, which is A1 reflected on P1 in L1,

$[A2 = A1 - 2(A1 \circ N1)N1]$;

the plane E1 $[(V1 \times A1) \circ (\mathcal{X} - L1) = 0]$;

the plane E3 $[(V1 \times A2) \circ (\mathcal{X} - L1) = 0]$;

P2 being arranged relative to said P1 and said A1 such that

plane E2 $[(V2 \times A1) \circ (\mathcal{X} - L2) = 0]$ is perpendicular to plane E1

$[L2 = L1 + d2^* A1; (V2 \times A1) \circ (V1 \times A1) = 0]$;

P3 being arranged relative to said P1 and said A2 such that

plane E4 $[(V3 \times A2) \circ (\mathcal{X} - L3) = 0]$ is perpendicular to plane E3

$[L3 = L1 + d3^* A2; (V3 \times A2) \circ (V1 \times A2) = 0]$.

30 (previously presented): Complex polarizer system for reciprocal polarization (cross-polarizer), comprising an arrangement of three polarizing beam splitting layers Pi (i=1,2,3);

the polarizing beam splitting characteristics of said Pi being described by a polarizing layer vector Vi coplanar to Pi such that linearly polarized light incident on Pi is maximally reflected if its plane of polarization is coplanar to Vi;

positioning said three layers such that there exists at least one position vector Li pointing to a point in each Pi so that

$[V2 \times (L2-L1)] \circ [V1 \times (L2-L1)] = 0$ (coupling of P1 and P2);

$[V3 \times (L3-L1)] \circ [V1 \times (L3-L1)] = 0$ (coupling of P1 and P3);

$k\,(L3-L1) = (L2-L1) - 2\,[(L2-L1) \circ N1]\,N1$ (coupling of the two couplings);

with N1 being the unit normal vector of P1, and $(a \circ b)$ being the scalar product of the two vectors a and b, and $(a \times b)$ being the cross product of the two vectors a and b.